

WHAT IS CLAIMED IS:

1. A method usable to reduce displacement errors in an image-correlation-based displacement measuring system, comprising:  
determining an estimate of an error amount corresponding to an  
uncompensated displacement value, the uncompensated displacement value  
representing a displacement between a reference image and a displaced image,  
wherein the estimate of the error amount is represented in the image-correlation-based displacement measuring system in relation to a displacement relative to an unspecified reference image position.
2. The method according to claim 1, further comprising generating the uncompensated displacement value based on a reference image and a displaced image.
3. The method according to claim 1, further comprising combining the estimated error amount and the uncompensated displacement value to determine a compensated displacement between the reference image and the displaced image.
4. The method according to claim 1, wherein:  
the estimate of the error amount is one of a plurality of error estimates represented in the image-correlation-based displacement measuring system in relation to displacements relative to an unspecified reference image position; and  
the displacements relative to an unspecified reference image position cover a range which is a significant portion of the maximum displacement range usable with a single reference image in the image-correlation-based displacement measuring system.
5. The method according to claim 1, wherein the estimate of the error amount is represented in a form comprising a look-up table.
6. The method according to claim 5, wherein the estimate of the error amount is represented in a form comprising a value based on interpolation between values represented in the look-up table.
7. The method according to claim 1, wherein:  
the estimate of the error amount is represented in a form comprising an error function representing the errors observed in the uncompensated displacement values determined by the image-correlation-based displacement measuring system

over a significant portion of a maximum displacement range usable with a single reference image in the image-correlation-based displacement measuring system; and

the error function includes at least a component related to a general curvature of the observed errors, the general curvature extending over a significant portion of the maximum displacement range usable with a single reference image in the image-correlation-based displacement measuring system.

8. The method according to claim 7, further comprising fitting the error function to a difference between reference values and uncompensated displacement values, wherein the reference values represent displacements between the reference image and displaced images, and wherein the uncompensated displacement values represent displacements between the reference image and the displaced images.

9. The method according to claim 8, further comprising minimizing the difference between the error function and the reference values.

10. The method according to claim 7, wherein the error function includes a first periodic component related to a periodic image-correlation interpolation error.

11. The method according to claim 10, wherein the error function includes a second component which modifies the amplitude of the first periodic component over a range which is a significant portion of the maximum displacement range usable with a single reference image in the image-correlation-based displacement measuring system.

12. An apparatus usable to reduce displacement errors in an image-correlation-based displacement measuring system, comprising:

a module determining an estimate of an error amount corresponding to an uncompensated displacement value, the uncompensated displacement value representing a displacement between a reference image and a displaced image, wherein the estimate of the error amount is represented in the module in relation to a displacement relative to an unspecified reference image position.

13. The apparatus according to claim 12, further comprising a module generating the uncompensated displacement value based on a reference image and a displaced image.

14. The apparatus according to claim 12, further comprising a module combining the estimated error amount and the uncompensated displacement value to

determine a compensated displacement between the reference image and the displaced image.

15. The apparatus according to claim 12, wherein:

the estimate of the error amount is one of a plurality of error estimates  
5 represented in the module in relation to displacements relative to an unspecified  
reference image position; and

the displacements relative to an unspecified reference image position  
cover a range which is a significant portion the maximum displacement range usable  
with a single reference image in the image-correlation-based displacement measuring  
10 system.

16. The apparatus according to claim 12, wherein the estimate of the error  
amount is represented in a form comprising a look-up table.

17. The apparatus according to claim 16, wherein the estimate of the error  
amount is represented in a form comprising a value based on interpolation between  
15 values represented in the look-up table.

18. The apparatus according to claim 12, wherein:

the estimate of the error amount is represented in a form comprising an  
error function representing the errors observed in the uncompensated displacement  
values determined by the image-correlation-based displacement measuring system  
over a significant portion of a maximum displacement range usable with a single  
20 reference image in the image-correlation-based displacement measuring system; and

the error function includes at least a component related to a general  
curvature of the observed errors, the general curvature extending over a significant  
portion of the maximum displacement range usable with a single reference image in  
25 the image-correlation-based displacement measuring system.

19. The apparatus according to claim 18, further comprising a module  
fitting the error function to a difference between reference values and uncompensated  
displacement values, the reference values represent displacements between the  
reference image and displaced images, and

30 wherein the uncompensated displacement values represent  
displacements between the reference image and the displaced images.

20. The apparatus according to claim 19, further comprising a module that  
minimizes the difference between the error function and the reference values.

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wherein the estimate of the error amount is represented in one of the control program and the image-correlation-based displacement measuring system in relation to a displacement relative to an unspecified reference image position.